INTRODUCTION AND MAP 1. SLOPE OF LAND SURFACE

Maryland Geological Survey

Quadrangle Atlas No. 22

HYDROGEOLOGY

by Edmond G. Otton

INTRODUCTION

This atlas describes the hydrology and geology of the Phoenix 7 1/2-minute quadrangle in northern Baltimore and Harford Counties, Maryland. It is intended for use by County, State, and Federal officials as well as planners, engineers, health officers, and the general public as a guide to water supply, waste disposal and land-use planning. The quadrangle covers an area of about 57 square miles of which about two-thirds is in Baltimore County and the remainder is in Harford County. Transportation throughout the area is facilitated by a network of blacktop roads. The Penn Central Railroad in the Gunpowder Falls valley formerly connected Baltimore with Harrisburg, but has recently been abandoned. Land use is chiefly agricultural and woodland with some suburban development, especially in the southern half of the quadrangle. Topography is mostly undulating to hilly, except for a few flat upland areas and the lowland valleys of the Little Gunpowder and its tributaries. Maximum relief is about 490 feet, and land elevation ranges from 250 to 740 feet above sea level. Figure 1 shows the location of the quadrangle in Maryland.

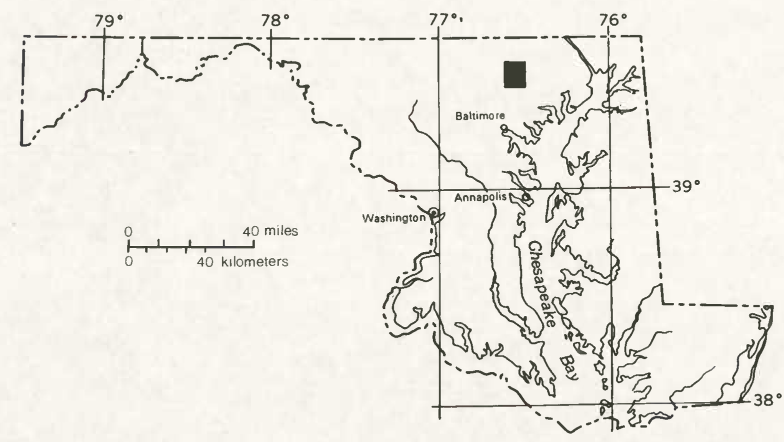

Figure 1.--Location of Phoenix quadrangle in Maryland.

HYDROLOGY

The source of ground water in the area is precipitation, which averages 44 inches annually. Hydrologic studies by Dingman, Ferguson and Martin (1956) have shown that about 60 percent (26 inches) of the annual precipitation is returned to the atmosphere by evapotranspiration and about 40 percent (18 inches) becomes total runoff to the streams. About 25 percent of the annual precipitation (11 inches) is discharged from the ground-water reservoirs as ground-water runoff (1956, p. 48). This is roughly equivalent to 525,000 gallons per day per square mile. The remaining 7 of the 18 inches of total runoff is largely overland flow.

The availability of ground water depends on the permeability and storage capacity of the fractured-rock aquifers. In many places the fractures and other voids in the rocks are of sufficient size and extent that wells drilled in them yield at least domestic supplies (a few gallons per minute). In some places the rocks are essentially impervious and yield little or no water. Some rocks, such as marble and gneiss, yield more water than others, such as phyllite or schist. The yield of individual wells depends also on their topographic position (valley wells are generally more productive than hilltop wells), the thickness of the weathered zone, and the extent and degree of rock fracturing at the site. Most of the ground water is of suitable chemical quality for domestic use.

GEOLOGY

The Phoenix quadrangle is in the Piedmont physiographic province. It is underlain by highly metamorphosed sedimentary rocks of early Paleozoic age and by the Baltimore Gneiss of Precambrian age. The metamorphosed sedimentary units are the Setters Formation, the Cockeysville Marble, and the Loch Raven Schist of the Wissahickon Group. The stratigraphic nomenclature follows the usage of the Maryland Geological Survey. For more detailed information on the geology, the reader is referred to Crowley (1976), Moller (1979), Southwick (1969), and Southwick and Owens (1968).

A mantle of soil and weathered rock material (saprolite) overlies the hard crystalline rocks. The saprolite ranges widely in thickness and may exceed 100 feet in a few places. It averages 20 to 30 feet thick. Alluvium and colluvium overlie both the rock and the saprolite along many of the stream valleys. The thickness of these materials is variable, but seldom exceeds 25 feet and may average less than 10 feet.

MAPS INCLUDED IN ATLAS

SLOPE OF LAND SURFACE

by Photo Science, Inc.

EXPLANATION

Five slope-area categories are shown on this map by four types of shading and by the absence of shading for the terrain category having a slope of 0 to 8 percent. Terrain having the maximum slope (greater than 25 percent) currently (1980) exceeds the maximum land slope permitted for the installation of domestic sewage-disposal systems (septic tanks) by the Baltimore County Health Department. As of 1980, the Harford County Health Department will not permit the installation of domestic disposal systems where the maximum land slope exceeds 20 percent. Intermediate terrain categories are useful in both counties in planning certain construction activities involving local roads and drains.

This map was prepared using topographic contour negatives by a process developed by the U.S. Geological Survey, Topographic Division. It is a semiautomated photomechanical process which translates the distance between adjacent contours into slope data. The slope zones on the map are unedited; thus, proximity of the same contour or absence of adjacent contours may produce false slope information at small hilltops and depressions, on cuts and fills, in saddles and drains, along shores of open water, and at the edges of the map.

LIMITATIONS OF MAPS

All the maps of this atlas represent some degree of judgment and interpretation of available data. The boundaries depicted on maps are approximate and subject to change where additional data are obtained. The density of information presented may not be adequate for local site evaluation.

SELECTED REFERENCES

Crowley, W. P., 1976, The geology of the crystalline rocks near Baltimore and its bearing on the evolution of the eastern Maryland Piedmont: Maryland Geological Survey Report of Investigations No. 27, 40 p.

Dingman, R. J., Ferguson, H. F., and Martin, R. O. R., 1956, The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources 1/ Bulletin 17, 233 p.

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Nutter, L. J., and Otton, E. G., 1969, Ground-water occurrence in the Maryland Piedmont: Maryland Geological Survey Report of Investigations No. 10, 56 p.

Southwick, D. L., 1969, Crystalline rocks of Harford County, in The geology of Harford County, Maryland: Maryland Geological Survey, p. 1-76.

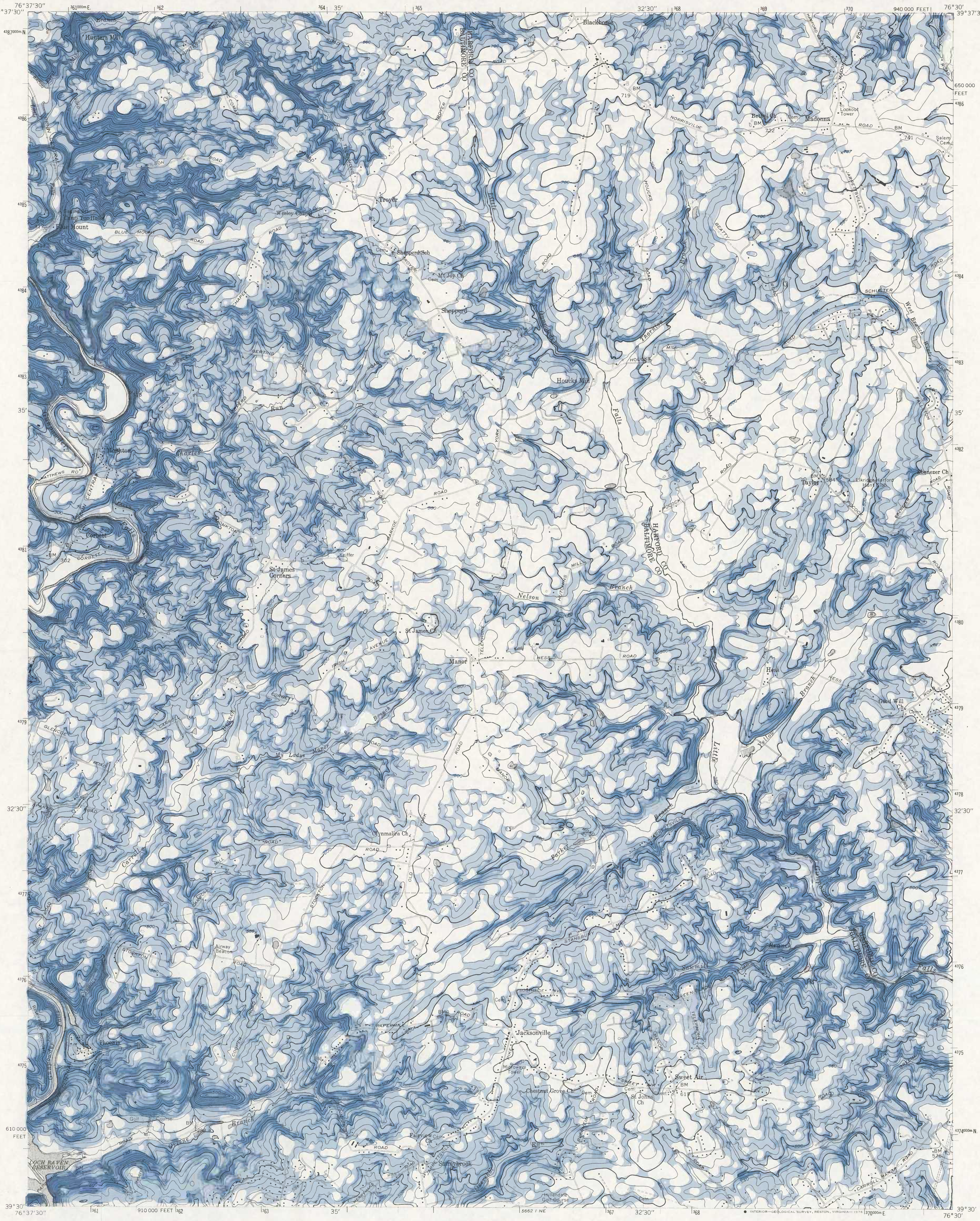
Southwick, D. L., and Owens, J. P., 1968, Geologic map of Harford County: Maryland Geological Survey, scale 1:62,500, 1 sheet.

1/ The name of this agency was changed to the Maryland Geological Survey in June 1964.

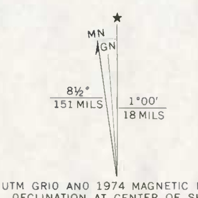
CONVERSION FACTORS

In this atlas, figures for measurements are given in inch-pound units. The following table contains the factors for converting these units to metric (System International or SI) units:

Inch-pound unit	Symbol	Multiply by	Metric unit	Symbol
inch	(in.)	25.40	millimeter	(mm)
foot	(ft)	0.3048	meter	(m)
mile	(mi)	1.609	kilometer	(km)
square mile	(mi^2)	2.590	square kilometer	(km^2)
U.S. gallon	(gal)	3.785	liter	(L)
U.S. gallon per minute	(gal/min)	0.06309	liter per second	(L/s)
U.S. gallon per minute per foot	[(gal/min)/ft]	0.2070	liter per second per meter	[(L/s)/m]



Base map is U.S. Geological Survey Topographic Map of the Phoenix Quadrange (7.5 Minute Series), 1943, Photorevised 1974

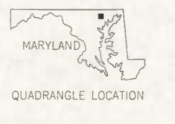


UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET

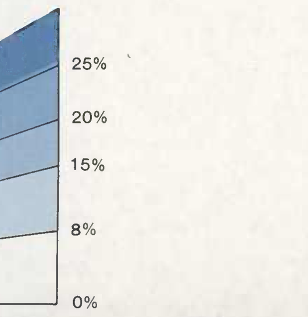
1983



QUADRANGLE LOCATION

Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

Prepared by **Photo Science, Inc.**, Gaithersburg Maryland. Utilizing contour negatives, furnished by United States Geological Survey.



MAP 2. DEPTH TO WATER TABLE

Maryland Geological Survey

Quadrangle Atlas No. 22

DEPTH TO WATER TABLE

by Edmond G. Otton

EXPLANATION

This map shows the approximate depth to the top of the zone of saturation (water table) as indicated by available well and spring records (Laughlin, 1966; and Nutter and Smigaj, 1975) and by other more recent unpublished records. However, most of the control for areas underlain by a shallow water table (0 to 10 ft) is based on an analysis of the drainage network shown on the topographic quadrangle. Delineation of areas underlain by a fairly deep water table (greater than 35 ft) is based mainly on water levels reported in well records, consideration of the topographic relief, and the distribution of areas of shallow water table. In some places, localized temporary zones of perched water may occur above the main water table. These are not shown on the map.

Ground-water levels fluctuate both seasonally and over longer periods in response to recharge from precipitation and to evaporation and transpiration. The water table declines slowly as water stored in the aquifers is discharged through springs and seeps and along the major water courses. Ground-water levels also fluctuate in response to pumping from wells, but in the area of this quadrangle the hydraulic effect of pumping from domestic wells is generally limited to distances of a few tens of feet from each well. The greatest fluctuation in the water table occurs beneath hills and uplands and the smallest in valleys and lowlands. Ground-water levels in valley bottoms may fluctuate only a few feet throughout a year.

In general, in the Maryland Piedmont ground-water levels are lowest in the fall and winter and highest in the spring, but some annual cycles may deviate from this pattern. Long-term fluctuations also occur, related chiefly to the variability of precipitation. The nature of the seasonal variation in the fluctuations of the water table is shown in figure 1, a plot of mean monthly water levels in observation well BA-CE 21 near Jacksonville in the southern part of the quadrangle (see map 5). This well is 350 ft deep and its record covers the period from November 1956 through March 1980. The mean values are based on a total of 204 monthly measurements. Figure 1 also shows the mean monthly precipitation at Towson, Md., during the same period of record. The graph shows that the highest water levels generally occur in March, April, and May and the lowest in October, January, and February. However, relatively high precipitation during August and September contributes little recharge to the aquifers because of the high rates of evaporation and transpiration prevailing during these summer months. By November and December, plant life becomes dormant, air temperatures drop, and precipitation again becomes effective in recharging the aquifer system, as shown by the rising water levels during these months.

The range of expected fluctuations in the water table at well BA-CE 21 is shown in figure 2, which shows the percentage of time the static water level was above a given stage. Thus, the figure indicates that during 60 percent of the time the water level fluctuated between 16 and 19.5 ft below the land surface with the median level for the period of record being 18.0 ft. This graph indicates the probable range in water-table fluctuations which might occur under similar geohydrologic conditions at other places in the quadrangle.

APPROXIMATE DEPTH TO WATER IN FEET BELOW LAND SURFACE

0 - 10 feet

10 - 35 feet

greater than 35 feet

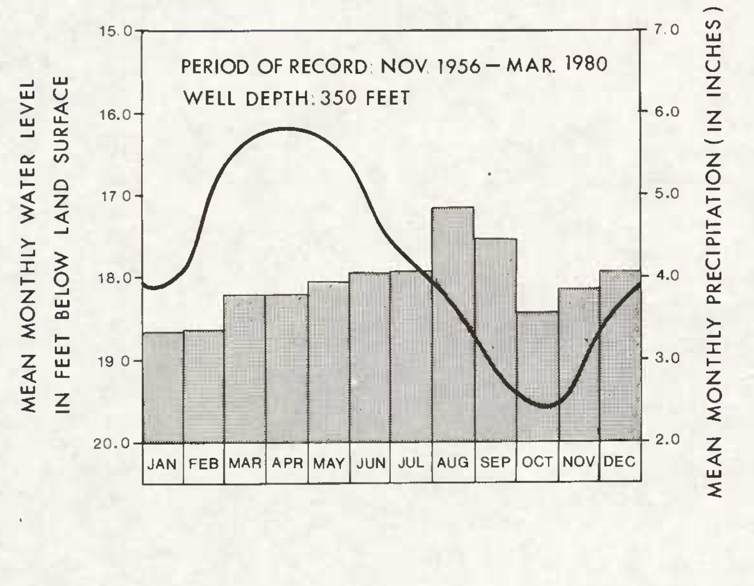


Figure 1.--Mean monthly water level in observation well BA-CE 21 and mean monthly precipitation.

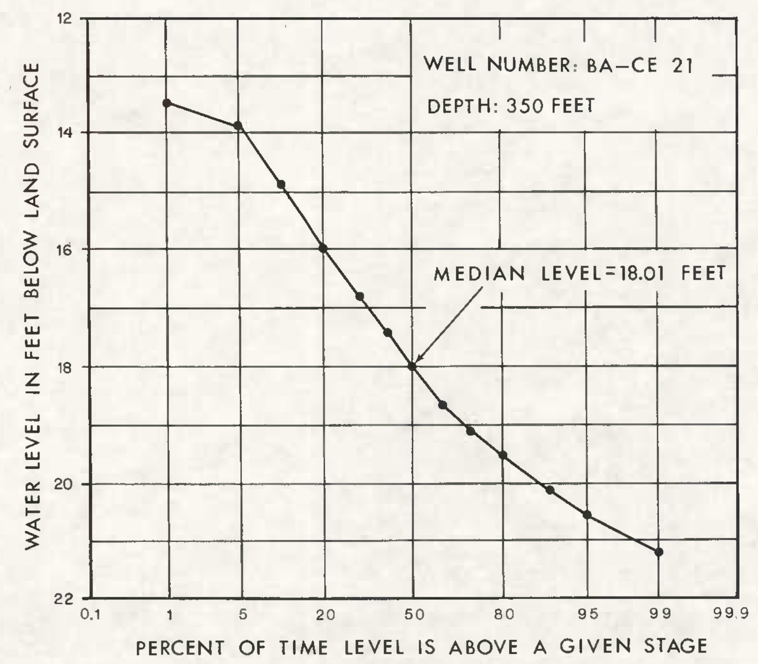


Figure 2.--Stage-duration graph of the water level in well BA-CE 21 near Jacksonville.

REFERENCES

Dingman, R. J., and Ferguson, H. F., 1956, The ground-water resources of the Piedmont part, in The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources Bulletin 17, 128 p.

Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report No. 1, 403 p.

Nutter, L. J., 1977, Jarrettsville quadrangle hydrogeology: Maryland Geological Survey Quadrangle Atlas No. 5 (4 maps and text).

Nutter, L. J., and Smigaj, M. J., 1975, Harford County ground-water information: Well records, chemical quality data, and pumpage: Maryland Geological Survey Water Resources Basic Data Report No. 7, 89 p.

CONTOUR INTERVAL 20 FEET

1983

QUADRANGLE LOCATION

Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

AVAILABILITY OF GROUND WATER

by Edmond G. Otton and others

NATURE OF OCCURRENCE

Ground water in the Piedmont of Baltimore and Harford Counties occurs in fractures and other voids in the crystalline rocks and in decomposed rock or saprolite, which forms a mantle of variable thickness over most of the bedrock. The source of almost all the water in the rocks is local precipitation amounting to about 44 in. per year.

Downward-moving water fills the voids and fractures in saprolite and rocks forming a zone of saturation at variable depths beneath the land surface. The upper surface of the zone of saturation is the water table, or potentiometric surface. This irregular surface fluctuates in response to changes in the rate of replenishment of the saturated zone and to changes in the rate of removal of water from the zone. Ground water is removed from the saturated zone by gravity flow to nearby streams, by pumping from wells, and by evapotranspiration where the roots of vegetation are sufficiently close to the saturated zone to extract water from it. Water is added to the zone chiefly from infiltrating local precipitation.

Where rocks in the saturated zone are capable of yielding water to wells and springs, they are termed "aquifers." Aquifers differ widely in their ability to yield water. In the Piedmont region, some rocks yield more water than others, depending principally on the nature and extent of their interconnected fractures and voids. Figure 1 is a generalized sketch showing ground-water occurrence and movement in a region underlain by crystalline rocks.

The yields of individual wells in the Phoenix quadrangle depend on the topographic position of the well, nature and thickness of the saprolite, and intensity and extent of fracturing of the rocks at the well site. In general, open fractures and voids in the rocks tend to decrease in size and become less abundant with increasing depth. This change is particularly evident below depths of 250 to 300 ft.

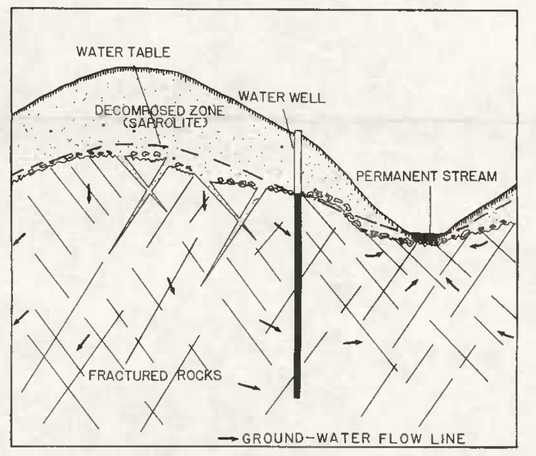


Figure 1.--Occurrence and movement of ground water in Piedmont terrain.

Unfractured and unweathered metamorphic crystalline rocks are essentially impermeable. Rocks containing several intersecting fractures are more permeable and accordingly are more likely to yield larger supplies of water to wells. Therefore, the distribution of fractures is a major factor governing the availability of water in them. An analysis of topography on maps and aerial photographs shows linear features which may identify major zones of rock fracturing. The orientation of many valleys and stream channels seems to be controlled by the zones of rock fracturing. Wells drilled in such zones may be expected to have above-average yields. The presumed existence of such fracture zones, or linear features, is shown on the accompanying map by the straight lines that follow the trend of numerous water courses.

The rocks underlying the Phoenix quadrangle consist chiefly of three formations--the Loch Raven Schist, the Setters Formation, and the Baltimore Gneiss (Moller, 1979). In addition to these units, the Cockeysville Marble is present near Hess, along Yellow Branch, and along a narrow belt about 1.5 mi south of Madonna. In the northeast corner of the quadrangle near Blue Mount, a 0.2-mile-wide band of ultramafic rock cuts across the Loch Raven Schist, but the total outcrop area of this rock is less than 1 mi^2. Analysis of the yields and specific capacities of 280 wells in the Phoenix quadrangle indicated a difference between the water-yielding characteristics of wells producing from the combined Loch Raven Schist and the Setters Formation and the wells producing from the Baltimore Gneiss. Thus, based on median values for well specific capacities and on the distribution of well-yield classes in the respective geologic units, two geohydrologic units (nos. 2 and 3) are recognized in the Phoenix quadrangle. The units and their characteristics are discussed below:

EXPLANATION

2

GEOHYDROLOGIC UNIT 2: Area underlain by the Baltimore Gneiss, a variously layered biotite-quartz-feldspar gneiss containing muscovite, tourmaline, and rare sillimanite. In many of the stream valleys the gneiss is overlain by a veneer of Quaternary alluvium, whose thickness ranges from 0 to 20 ft.

WELL YIELDS AND DEPTHS: The reported yields [1/] of 121 wells, chiefly 6-inch-diameter domestic wells, range from 0 to 40 gal/min, and the median yield is 6 gal/min. Figure 2 shows the distribution of well yields by yield class and adequacy categories.

The depths of 130 wells in unit 2 range from 50 to 377 ft and the median depth is 128 ft.

In general, wells drilled along linear features, as observed on aerial photos or topographic maps, may be expected to have yields greater than the average for the unit. This is because these features commonly indicate zones of rock fracturing. Nutter and Otton (1969, p. 18-21) discuss the significance of linear features with regard to well yields.

WELL SPECIFIC CAPACITIES: Reported specific capacities [2/] of 130 wells range from 0.00 to 4.0 (gal/min)/ft and the median value is 0.13 (gal/min)/ft. Based on its reported specific capacity of 4.0 (gal/min)/ft, the most potentially productive well is BA-CD 155 located in a ravine north of the crossroads of Vernon in the southwest corner of the quadrangle. This 98-ft-deep domestic well appears to be situated along a major north-trending linear feature. It reportedly yielded 12 gal/min with a drawdown of only 3 ft at the end of 4 hours of pumping.

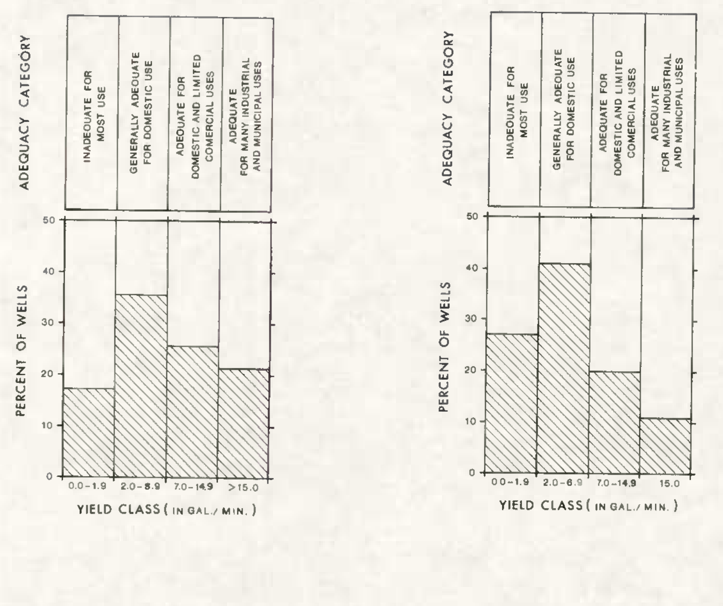


Figure 2.--Yield class graph for Geohydrologic Unit 2 and Unit 3.

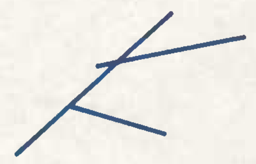
3

GEOHYDROLOGIC UNIT 3: Includes areas lying both north and south of the Baltimore Gneiss dome and underlain by the Loch Raven Schist and the Setters Formation. The Loch Raven Schist is a uniform, medium- to coarse-grained schist consisting of a biotite-oligoclase-muscovite quartz plus garnet, staurolite, and kyanite. Locally, it contains quartz pods and stringers; pegmatite occurs at some places. The Setters Formation occurs as a narrow band surrounding the Baltimore Gneiss and is a layered, flaggy weathering, muscovite-microcline quartzite. It commonly forms a high ridge along its outcrop area.

WELL YIELDS AND DEPTHS: The yields [1/] of 150 wells, mainly domestic wells, range from 0 to 40 gal/min and the median yield is 4.0 gal/min. Figure 3 shows the distribution of well yields by yield class and adequacy category. The figure shows that approximately 70 percent of the wells have reported yields of less than 7 gal/min (the two lower categories).

The depths of wells are in a range similar to that of unit 2. As in unit 2, wells drilled on or near linear features may be expected to have above-average yields.

WELL SPECIFIC CAPACITIES: The reported specific capacities [2/] of 150 wells range from 0.00 to 4.0 (gal/min)/ft and the median value is 0.07 (gal/min)/ft. Based on its specific capacity, the potentially most productive well is BA-CE 235, located approximately 0.5 mi northeast of Jacksonville. This well reportedly yielded 20 gal/min with 5 ft of drawdown at the end of a 4-hour pumping test. The well is 88 ft deep and is in the Loch Raven Schist.



Linear features are natural alignments visible on aerial photographs. They include topographic depressions and ridge crests, straight drainage segments and straight, narrow bands of light or dark tone which may indicate anomalous vegetation or soil-moisture alignments. Linear features could reflect planes of bedding or foliation, rock boundaries or prominent lithologic horizons, faults or joints.

REFERENCES

Crowley, W. P., Reinhardt, Juergen, and Cleaves, E. T., 1976, Geologic map of Baltimore County and City: Maryland Geological Survey, scale 1:62,500, 1 sheet.

Dingman, R. J., and Ferguson, H. F., 1956, The ground-water resources, in The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources Bulletin 17, p. 1-128.

Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report 1, 403 p.

Moller, S. A., 1979, Geologic map of the Phoenix quadrangle, Maryland: Maryland Geological Survey scale 1:24,000, 1 sheet.

Nutter, L. J., and Otton, E. G., 1969, Ground-water occurrence in the Maryland Piedmont: Maryland Geological Survey Report of Investigations 10, 56 p.

Nutter, L. J., and Smigaj, M. J., 1975, Harford County ground-water information: Well records, chemical-quality data, and pumpage: Maryland Geological Survey Basic Data Report No. 7, 89 p.

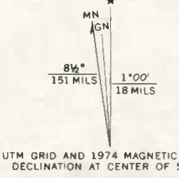
Southwick, D. L., and Owens, J. P., 1968, Geologic map of Harford County: Maryland Geological Survey, scale 1:62,500, 1 sheet.

1/ Only wells for which the driller reported a yield test of 2 hours duration, or longer, were used in this analysis.

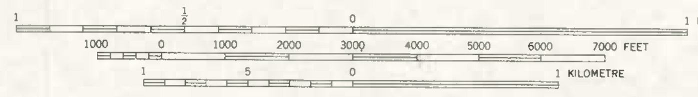
2/ Specific capacity of a well is the yield per foot of drawdown of the water level in the well. No time period is specified for the measurement of this variable, which is commonly expressed in gallons per minute per foot of drawdown (gal/min)/ft . For many domestic wells, the period of measurement ranges from 2 to 6 hours. Analyses include only wells tested for 2 hours or longer.

MAP 3. AVAILABILITY OF GROUND WATER

Maryland Geological Survey | Quadrangle Atlas No. 22



UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



CONTOUR INTERVAL 20 FEET

1983

QUADRANGLE LOCATION

Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

MAP 4. GEOHYDROLOGIC CONSTRAINTS ON SEPTIC SYSTEMS

Maryland Geological Survey
Quadrangle Atlas No. 22

CONSTRAINTS ON INSTALLATION OF SEPTIC SYSTEM

by Edmond G. Otton

EVALUATION OF UNITS

The units shown on this map differ in their suitability for domestic liquid-waste disposal systems because of differences in soil and subsoil infiltration characteristics, land slope, depth to water table, flood hazard, and the existence at various places of a thin or rocky soil mantle over bedrock. These elements are discussed below:

1. Flood hazard: Most valleys in the Phoenix quadrangle are subject to periodic flooding. Floods would cause uncontrollable dispersal of sewage and possible physical damage to the disposal system.

2. Shallow water table: The 10-ft depth to the water table used as a constraint in this report is the sum of three component factors. These are: (a) The recommended depth of drain tile fields is 3 ft below the land surface (U.S. Department of Agriculture, Soil Conservation Service, 1971, p. 3); (b) a minimum depth of 4 ft between the base of the tile field (absorption trench) and the underlying water table is recommended (U.S. Public Health Service, 1967, p. 11); and (c) a 3-ft additional depth is suggested to allow for seasonal variations in position of the water table, which commonly fluctuates through at least a 3-ft range in Piedmont valleys.

3. Depth to bedrock: Where bedrock crops out or occurs near the land surface, the construction of underground disposal systems is not feasible; hence, the presence of rock is an obvious geologic constraint.

4. Slope: Steep slopes are considered to be a major contributing cause of the failure of underground sewage disposal systems (U.S. Public Health Service; 1967, p. 18; and U.S. Department of Agriculture, Soil Conservation Service, 1971, p. 8). Land slopes in excess of 25 percent were obtained from a machine-generated slope map prepared by the U.S. Ceological Survey. Maryland Department of Health regulations (July 1964, Section 1, definitions, part 1.9) do not permit, as of 1979, the installation of underground domestic sewage disposal systems where the slope of the land is in excess of 25 percent. Harford County limits the installation of such systems to a slope not in excess of 20 percent.

5. Infiltration rate: This factor affects the design of the disposal system. If infiltration into the soil is too slow, drainage will be sluggish and effluent may back up into the septic tank and to the household plumbing. If too fast, renovation of the liquid effluent may be inadequate and the ground water may be subject to pollution. In Maryland, infiltration rates are evaluated at the proposed disposal site by means of percolation tests.[1/]

These five factors were evaluated in order to generate three units on the accompanying map. Thus, the terrain is classified according to its constraint or limitation for the installation of domestic underground sewage disposal systems. In preparing the map, considerable use was made of the soil surveys of Baltimore and Harford Counties (Reybold and Matthews, 1976, and Smith and Matthews, 1975).

MAP UNITS

I

UNIT I (Maximum constraints): Disposal systems constructed in this unit face a high probability of failure. The unit includes low-lying valley-bottom areas where the depth to the water table ranges from 0 to 10 ft and other areas where the slope of the land surface exceeds 25 percent. Unit I is underlain by stream alluvium, colluvium, and rocky land, or land underlain by a thin veneer of stony soil. Many of the valley bottoms are subject to periodic flooding.

Relatively few percolation tests have been made in Unit I, but visual examination of the soil and subsoil along the valley floors indicate they are relatively impermeable. Common soil types in the valleys are Hatboro, Codorus, Comus, and Baile (U.S. Department of Agriculture, 1975 and 1976). These soils commonly are poorly drained and have a water table that is seasonally at or near the surface. They are neutral to acidic and commonly poorly permeable, especially in areas where their clay content is high.

Common soils along the steep hillsides are the Mt. Airy, Manor, and Clenelg series. Quartzite boulders and fragments of schist are common on the steeper slopes.

II

UNIT II (Marginal to variable constraints): Disposal systems constructed in this unit face less severe constraints than in the unit above and the constraints are somewhat variable from place to place within the unit. Generally, in this unit the depth to the water table is greater than 10 ft and the land slope ranges from 15 to 25 percent. In some places a combination of land slopes of nearly 25 percent and thin, stony soils, or the presence of bare rock, may create conditions similar to Unit I. Harford County health regulations (as of 1979) will not permit underground disposal systems where the land slope exceeds 20 percent.

The designation of Unit II was based largely on the distribution of the following soils in the quadrangle (Reybold and Matthews, 1976; and Smith and Matthews, 1975): Glenelg loam (CcD2 and GcD3); Glenville silt loam (CnA), Legore silt loam (LeD2); Manor loam and Manor channery loam (MbD2, MbD3, McD2, and McD3); Mt Airy channery loam (MtD2 and MtD3); and Watchung silt loam (WaA and WaB). In evaluating soils for their limitations for underground disposal systems, considerable use was made of table 7 entitled "Limitations of soils for town and country planning" (Reybold and Matthews, 1976, p. 120-129). In this table, the soils indicated above are rated as having severe to moderately severe limitations for use as filter fields chiefly because of land slopes exceeding 15 percent, and because at many places the depth to bedrock is less than 3 ft. Most of the soils listed above are mildly acidic in character and have a high available moisture capacity.

III

UNIT III (Minimum constraints): Geohydrologic conditions in this unit are the most favorable for the installation of domestic sewage disposal systems. Slopes of the land surface are generally less than 15 percent, and the unit commonly occupies well-drained, interfluvial areas underlain by Chester, Manor, and Clenelg soils. Depth to the permanent water table is nearly everywhere greater than 10 ft, and in many places more than 35 ft. Locally, the depth of weathered rock (saprolite) may be more than 35 ft.

Percolation tests have a high success rate in Unit III, especially those conducted at depths greater than 5 to 6 ft. However, the possibility of pollution of the underlying fractured-rock aquifers still exists where deep disposal pits end in subsoils or fractured rock having very rapid percolation rates.

REFERENCES

Crowley, W. P., Reinhardt, Juergen, and Cleaves, E. T., 1967, Geologic map of Baltimore County and City: Maryland Geological Survey, scale 1:62,500, 1 sheet.

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1/ The standard percolation test in the Maryland Piedmont counties (1979) is performed as follows: A 2- to 3-ft-wide pit is dug to the depth to be tested, and a 1-ft-square hole is hand-excavated on the floor of the pit. The 1-ft deep hole is filled with water, and the time required for the water to drop the second inch of a 2-in. decline is measured. To be rated as "passing" or successful, the rate of drop of the water level must be between 2 and 30 minutes per inch. Declines of the water level at rates too fast or too slow are the basis for rejection of the unit of land sampled by the test. Also, the presence of shallow ground water or rock ledges is an additional basis for rejection of the test site. Where clayey or other nearly impervious materials are encountered in a test pit, the actual test may not be done, based on the judgment of the sanitarian making the test. If a test is unsuccessful, another test may be made at a different depth or at another site on the lot or tract.

Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

1983

MAP 5. LOCATIONS OF WELLS AND SPRINGS

Maryland Geological Survey[1] Quadrangle Atlas No. 22

LOCATION OF WELLS AND SPRINGS

by E. M. Sadecki and J. T. Hilleary

EXPLANATION

Information for wells and springs shown on the map is contained in a publication by Laughlin (1966) and in a later publication by Nutter and Smigaj (1975). Data compiled for wells subsequent to these publications are on file at the U.S. Geological Survey office, Towson, Md., and at the Maryland Geological Survey, Baltimore, Md. Drillers' logs and well-construction records are available for most of the wells shown.

Well-numbering system: The wells and springs located on the map are numbered according to a coordinate system in which Maryland counties are divided into 5-minute quadrangles of latitude and longitude. The first letter of the well number designates a 5-minute segment of latitude; the second letter designates a 5-minute segment of longitude. These letter designations are followed by a number assigned to wells sequentially. This letter-number sequence is the quadrangle designation, which is preceded by an abbreviation of the county name. Thus, well BA-BA 7 is the seventh well inventoried in quadrangle BA in Baltimore County. In reports describing wells in only one county, the county prefix letters are frequently omitted from the well number. However, the numbering system currently in use (1980) differs slightly from that used in earlier published reports, such as Dingman and Ferguson (1956). In this latter report, well BA-BA 7 was designated as Bal-Ba 7. The discontinuance of the use of lowercase letters was necessitated by the change in 1970 to a computer storage and retrieval system for well information.

Water wells drilled in Maryland since 1945 also have a number (not shown on this map) assigned by the Maryland Water Resources Administration. This number consists of a two-letter county prefix (for example, BA for Baltimore County and HA for Harford County) followed by a two-digit number indicating the State fiscal year in which the permit was issued (for example, -72 for the 1972 fiscal year). A four-digit seqential number follows the fiscal year designation. Thus, well BA-72-0010 is the 10th well permit issued for Baltimore County during the 1972 fiscal year. After F.Y. 1972, all permit wells have been identified with the year code -73-, because of the use of pre-stamped metal tags required to be affixed to the well.

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WELL AND NUMBER

23

SPRING AND NUMBER

REFERENCES

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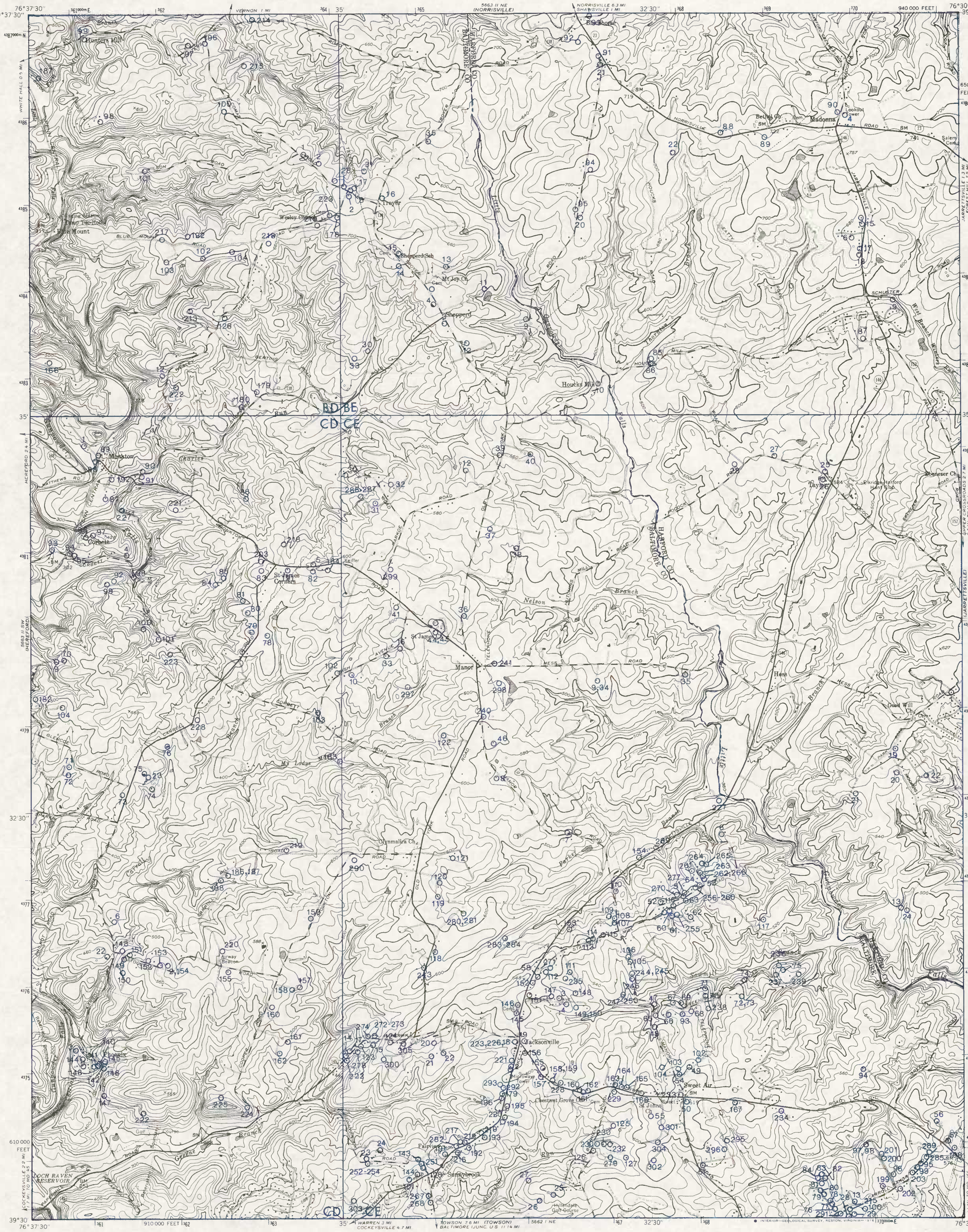
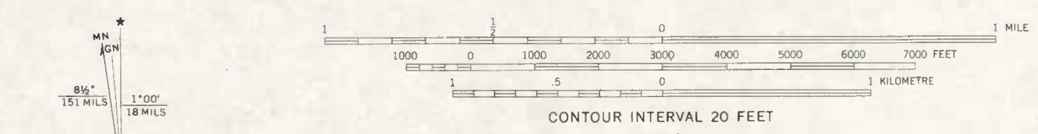
Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report No. 1, 403 p.

Nutter, L. J., and Smigaj, M. J., 1975, Harford County ground-water information: Well records, chemical-quality data, and pumpage: Maryland Geological Survey Water Resources Basic Data Report No. 7, 89 p.

1/ The name of this agency was changed to the Maryland Geological Survey in June 1964.





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